

De la Beche, and Lyell were its associates, all honestly endeavouring "to seek the proper end of philosophy, by arranging multifarious and seemingly discordant facts into a chain of natural links." (Bakewell.) The speculative geologists had not, at that time, ceased to strongly influence the rising science; and Prof. Phillips, one among the best of observers, kept the hypothetical aspects of many a well-ordered series of facts fully in view; and now even, in his manual for beginners, instead of describing the actual composition and state of the material of which he is treating (for instance, the atmosphere, p. 17, &c.), and giving the student useful practical information about it, he rather enters into a disquisition upon what he considers it was ages ago. Thus certain long-cherished hypothetical views as to the original conditions of land, water, and atmosphere are here as unnecessarily presented for the consideration of juvenile students as the "Devonian" question is in Mr. Jukes's little manual.

In his account of geology, in the 'Guide,' Prof. Phillips first treats of the mass of the globe; 2, the crust of the earth, and its structure; 3, land and sea; 4, climate; 5, the series of life; 6, lapse of time; 7, succession of rocks in the crust of the globe, with many useful little tables; 8, lithology. He does not figure the fossils in this little book, and indeed the woodcuts of manuals are of no use for the identification of species; but he judiciously illustrates his chapter on lithology, in which all the chief rock-substances and common minerals are clearly and concisely described according to their associations.

There is no doubt that Professor Phillips's 'Guide' is fully trustworthy, being very good, though occasionally rhetorical, and often apt to deal with problems that the philosophy of geology rather dreams of than understands. The author, however, clearly states that he intends this little work to help, first, those inquiring what geologists think probable as well as certain in the history of the globe, and what the facts and reasonings are on which these suppositions and conclusions are based; and secondly, the more earnest order of inquirers—real students of nature, desirous of adding to the facts, advancing the reasonings, perfecting the conclusions, and taking part in the actual progress of geology.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

Nov. 10, 1863.—E. W. H. Holdsworth, Esq., F.Z.S., in the Chair.

DESCRIPTIONS OF THREE NEW GENERA OF MARINE FISHES OBTAINED AT MADEIRA. BY JAMES YATE JOHNSON, CORR. MEM. Z. S.

Order ACANTHOPTERYGII.

Fam. CARANGIDÆ, Günther.

DIRETMUS, gen. nov.

Body much compressed and elevated, covered with small spinous

scales. Abdomen prominent and keeled. Mouth large, non-protractile; minute pointed teeth in the jaws, none on the palate; a pair of large tooth-like bony processes projecting from the anterior ends of the maxillaries, and entering the mouth between the vomer and the premaxillaries. Head, opercular pieces, and mandibular bones bearing numerous thin bony crests. Eyes large. A single dorsal fin commencing about the middle of the body over against the anal fin, both being continuous. Perfect thoracic ventral fins, with a free bony appendage at the upper angle of their roots. Pseudobranchia present. Branchiostegal membrane with seven rays. No lateral line.

The small but highly interesting fish upon which this new genus has been established appears to be allied to fishes belonging to genera some of which have been placed by Dr. Günther amongst the *Scombridae*, others amongst the *Carangidae*—families distinguished by him on account of differences in the number of the vertebræ. I have been unwilling to open the single specimen obtained with a view to the determination of this point, but place the genus provisionally amongst the *Carangidae* on account of its many resemblances to *Antigonia*. It may be entered in the synopsis of the genera of that family (Cat. Brit. Mus. Coll. p. 418), in sect. β of the first group, *Carangina*, thus:—

Ventrals with a free bony appendage.

These appendages, the tooth-like processes of the maxillaries, and the crests about the head present an assemblage of characters quite sufficient to separate this form distinctly from all other known Acanthopterygian genera.

DIRETMUS ARGENTEUS, sp. n.

D. 27. A. 22. P. 18. V. 10? C. 19. M. B. 7.

The body is much compressed, and so elevated that without the tail and its fin it is subcircular. The height to the total length is about 1 to $1\frac{3}{4}$. The abdomen is prominent and keeled, and the nape is trenchant. It is of a silvery-grey colour, with darker grey near the dorsal and anal fins. The skin, when the scales are removed, is fuscous. The whole body is clothed with small, somewhat deciduous scales, having four or five broad teeth at the edge and some minute spines on the exposed surface. Each scale is constricted at the middle; the posterior portion is rather larger than the anterior, and marked with curved transverse striæ. The *head* is large, being contained in the total length only about $2\frac{2}{3}$ times. It is remarkable for the numerous crests of thin bone, many of which are minutely denticulated. The cheeks are scaly; but the opercle and maxillary are without scales. The *eye* is round and large, its diameter compared with the length of the head being as 1 to $2\frac{1}{2}$. It is placed high up, a diameter and a half above the throat, but does not quite reach to the profile, and a space equal to less than half the diameter intervenes between it and the muzzle. A thin bony crest is placed behind it, and another in front of it, the latter forming a funnel-shaped cavity below the rather large nostril. Between the eyes there are three low crests without serratures, the middle one of which di-

vides behind. The muzzle is short and obliquely truncate; the lower jaw remarkably deep, and projecting beyond the upper, with an acute boss at the symphysis. The upper border of the mouth, which is strongly oblique, is formed entirely of the slender premaxillary, carrying a double series of minute teeth which are sharp and slightly curved, and reduced in front to a single series. Similar teeth are placed in a single row in the lower jaw. The small tongue, the palatines, and prominent vomer are toothless; but from the upper ends of the maxillaries there projects into the mouth a pair of large tooth-like bones that are compressed, somewhat falcate, and blunt at the tips. The tongue, pharynx, and inner sides of the gill-covers are deep black. The maxillary is extremely broad below, and reaches to within a quarter of the diameter from the vertical from the posterior border of the eye. The dilated portion has numerous radiating crests, which are minutely denticulated. The mandibular bones also carry denticulated crests. The seven-rayed branchiostegal membrane is completely concealed by the gill-covers. There are no toothed processes on the œsophagus, nor any folds of skin on the palate. The *opercle* is high, the width, from back to front, being less than one-third of its vertical length. There is an elevated crest at its anterior margin, which is minutely toothed; and the rest of its surface is furnished with numerous simple crests that radiate from a point high up near the anterior margin. The free edge of the opercle is even. The preopercle is narrow, and its lower margin is denticulated; some of its crests are also denticulated. The interopercle is large, and projects beyond the throat; it bears numerous crests, that are denticulated and form small sharp teeth at the margin. The gill-openings are wide; pseudobranchiæ are present; the first free pair of gills carries a series of spiny rakers of moderate length.

The single *dorsal* fin is moderately long, and commences over the vent, somewhat in front of the middle of the back. It appears to be higher in front, and to be destitute of scales. All the rays, except perhaps the last two or three, seem to be simple spines. They are stout, closely set; and the first five are compressed, with minute teeth at their edges; the remaining spines of the fin have also teeth at their edges. It terminates at the end of the curve of the back, where the parallel-edged tail abruptly commences. The *anal* fin is rather shorter than the dorsal fin; their terminations are in the same vertical. The rays seem to be of the same structure, with spinous edges; but it seems not to have been higher in front. The *pectoral* fin is rather long (about one-third of the total length), rounded at the tip, and inserted below the middle of the height on a level with the bottom of the opercle. The first ray is less than one-third of the second; the fourth ray is slightly the longest; the rays begin to shorten rapidly with the seventh. All except the first two are branched, and these are denticulate on their anterior edges. Several of the others are also denticulate at the sides. The thoracic *ventral* fins are placed slightly behind the root of the pectoral fins. They reach back at least as far as the commencement of the anal fin, but are apparently

not elongate. Some of the rays have denticulate edges. At the upper base of each fin there is a free white ovate appendage of bone, nearly seven times as long as wide, resembling in shape the wings of some insects. The surface is obliquely striate, and the sharp edge of the anterior margin is set with a few distant minute teeth. At its base there is a small process directed backwards. The *vent* is in front of the middle of the total length, and the anal fin begins immediately behind it. The *tail* is compressed, and a little longer than high. The caudal fin is forked.

There is no lateral line. A series of about sixty scales may be counted between the opercle and the caudal fin, and about fifty in the height.

The individual was obtained in the month of January. The vertical fins appeared to have suffered damage, and nothing can be positively asserted in regard to certain points which it is desirable to know, such as the height and outline, and the structure of the rays. Neither could it be ascertained whether they had been covered with scales; but it may perhaps be inferred, from the spinous sides of the rays, that this had not been the case. The rays of the ventral fins seemed to be ten; but whether these were really only five rays split to their bases I could not make out with any degree of certainty. No connecting membrane was to be seen between the first five spines of the dorsal fin, but it may have been removed by accident. The fish had fed on animal food.

The following table shows the dimensions of the principal parts of the specimen, which has been sent to the British Museum:—

	inches.
Total length (caudal fin somewhat mutilated)	3 $\frac{8}{10}$
Length to commencement of tail	2 $\frac{6}{10}$
Height	2 $\frac{3}{10}$
Thickness at shoulder	$\frac{4}{10}$
Head, length	1 $\frac{4}{10}$
Mouth-cleft, depth	$\frac{5}{10}$
————, width, nearly	$\frac{4}{10}$
Premaxillary, length	$\frac{9}{10}$
Maxillary, width of lower end	$\frac{6}{10}$
Eye, diameter	$\frac{6}{10}$
Opercle, height	1
Dorsal, distance from muzzle	1 $\frac{7}{10}$
——, length of base	1 $\frac{3}{10}$
Pectorals, length	1 $\frac{2}{5}$
————, distance from muzzle	1 $\frac{3}{10}$
Ventrals, distance of their roots from roots of pec- torals	$\frac{7}{10}$
Appendage of vertical fins, length	$\frac{7}{10}$
———— —————, width, rather more than	$\frac{1}{10}$
Anal, length of base	1 $\frac{1}{10}$
Tail, length	$\frac{4}{10}$
——, height	$\frac{5}{10}$
Caudal fin (mutilated)	$\frac{7}{10}$

Order MALACOPTERYGII.

HALOSAURUS, gen. nov.

Body elongated, clothed with cycloid scales; belly rounded; tail compressed and tapering to a point. Snout projecting much beyond the mouth, which is non-protractile and of moderate size, with the upper border formed by the premaxillary and maxillary bones, the former small, the latter of moderate size and not reaching beyond the eye, both dentiferous. Teeth in villiform bands, in the jaws and on the vomer, palatines, and tongue. A short dorsal over the space between the abdominal ventrals and the long anal, which is coalescent with the caudal, the latter consisting of very few rays. Large gill-openings. Branchiostegal membrane with numerous rays. Stomach cæcal; pyloric cæca in moderate number; a large air-bladder.

No pseudobranchiæ, no barbel nor adipose dorsal.

HALOSAURUS OVENII.

D. 11. P. 11. V. 10. A. 191! C. 2. M. B. 14. Scales of lateral line about 170.

Body elongated, compressed, attenuating in both directions from the neighbourhood of the dorsal fin, the tail becoming filiform; the belly rounded, except in the neighbourhood of the ventral fins, where it is flattened. Clothed with cycloid scales of a moderate size. The height compared with the total length is as 1 to $14\frac{1}{5}$. The back and sides are brown, the middle of each scale being bluish grey with minute black dots. The belly is grey.

The *head* has something of the aspect of that of a *Macrourus* or a *Coilia*, the mouth being on the underside. Compared with the total length it is as 1 to $7\frac{1}{2}$. It is unarmed, scaly, slender and depressed, with a projecting snout. At the back there is a transverse narrow scaleless groove, which curves forwards slightly. The lateral *eye* is oval, with an angle before and behind. Compared with the length of the head it is as 1 to 5. It reaches to the profile, and is distant from the snout nearly two of its longer diameters; and the space between the eyes is less than one of such diameters. The snout is curiously formed; it is much depressed and narrows forwards, but the extremity is rounded. There is an undulating crest near each edge above, and another at each side below, with a mesial keel underneath. It is scaleless, and covered with a soft gelatinous skin. There is a crest across the cheek below the eye, and a groove extends forwards from the inferior margin of the orbit at each side of the snout.

The moderate-sized *mouth* does not reach nearly to the tip of the snout. Neither jaw is in the least protractile. The anterior portion of the upper border is formed by the premaxillary, the remainder by the maxillary, and both bones are set with a band of minute sharp villiform teeth. There is a crest along each border of the maxillary; and that at the posterior margin projects as a tooth, which reaches to the orbit. The maxillary is simple, not composed of three pieces as in the *Clupeidæ*. The mandible is set with teeth similar to those before described. There are no teeth on the vomer;

but the short palatines (which come into contact in front) bear minute teeth, and in a line with them behind are the entopterygoids or pterygoids with narrow bands of minute teeth. The rakers of all the branchial arches carry similar teeth. On the hinder part of the tongue, which is black and free at the tip, there is an ovate patch of minute teeth. The mouth is black, as well as the inside of the gill-covers. The gill-openings are large, and the gills consist of four pairs. The subopercle is thin, scaleless, and striate; it projects backwards considerably beyond the opercle, which is scaly, with a rounded even edge. The margin of the preopercle is concealed in the scaly skin. The two orifices of each nostril are small and near together. There is a small cuticular tag at the margin of each orifice.

The triangular *dorsal* fin is placed over the space between the ventral fins and the vent. There are scales on the membrane between the rays. The second and third rays are the longest, and are about twice as long as the base of the fin. The first ray is unbranched, and is only half as long as the two next. The *pectoral* fins are scaleless, pointed, and longer than the ventral fins. They are inserted in the upper half of the height, and have narrow bases. The abdominal *ventral* fins are distinct, but inserted close together; they are scaly, truncate, and the first two rays are unbranched. At the outer angle of the base there is a thin pointed scale. The *vent* is placed in the anterior half of the total length of the fish, and has no papilla near it. The *anal* fin is high throughout, but is higher in front than behind. The first three rays are unbranched; the base is scaly, and the fin extends with numerous rays up to the *caudal*, which is represented by two hair-like rays.

The *lateral line* is very low down, and commences at the lower angle of the subopercle. It follows a straight course until it reaches the lower edge of the body, where it is lost. About 170 scales may be counted in the length of the body between the opercle and the tip of the tail. In the height of the body there are twenty-two scales, of which five are below the lateral line.

The single individual obtained was caught in the month of February. It was a female with eggs, which lay in two masses side by side, $5\frac{1}{2}$ inches long, uncovered with a sac. The cæcal stomach was small, and contained nothing but a little much-digested matter. There were twelve small pyloric cæca, which increased in length backwards. The air-bladder had a delicate silvery coat, and was 5 inches long. The liver had a length of $1\frac{1}{2}$ inch. The intestine was straight. The peritoneum was black anteriorly; posteriorly there were patches of black lines on a pale ground.

The following are the dimensions of the specimen, which is now in the British Museum:—

	inches.
Total length	$18\frac{5}{8}$
Height between dorsal and ventral	$1\frac{3}{8}$
Head	$2\frac{7}{8}$
Eye, longer axis, nearly	$\frac{1}{2}$

	inches.
Eye, distance from tip of snout	$\frac{19}{20}$
Eyes, distance apart.	$\frac{7}{20}$
Dorsal, length of base	$\frac{7}{10}$
——, height	$1\frac{1}{4}$
——, distance from snout.	$5\frac{3}{8}$
Pectorals, length	$1\frac{5}{8}$
——, width of base	$\frac{1}{5}$
——, distance from snout.	$2\frac{1}{2}$
Ventrals, length	1
——, distance from snout	$4\frac{6}{10}$
Vent, distance from snout	$7\frac{1}{8}$
Anal, height of fourth and the neighbouring rays . .	$\frac{4}{5}$
Caudal, two rays	$\frac{4}{10}$

This species is dedicated to Professor Richard Owen, Superintendent of the Natural History Departments of the British Museum, whose investigations in regard to the skeleton of fishes are not the least valuable part of his many contributions to zoological science.

CHIASMODON, gen. nov.

Body naked, elongate, with two perfect dorsal fins, one anal fin, simple thoracic ventral fins, and distinct caudal fin. Head unarmed and exappendiculate. Snout short, truncate. Cleft of the mouth very long, extending much beyond the eyes. Acute teeth in two series in the premaxillary and the mandible, those of the inner series being moveable. Hooked teeth, and teeth that cross each other from opposite sides of the mouth in the upper jaw. Teeth on the palatines, but not on the vomer. Eyes lateral. Gill-openings large; four pairs of gills. Seven branchiostegal rays. No pseudobranchiæ: no anal papilla. An air-bladder.

CHIASMODON NIGER, sp. n.

1st D. 11. 2nd D. 13. A. 17. P. 12. V. 6. C. 14. M. B. 7.

Body black, naked, moderately elongate, compressed, and slender. Head unarmed, thick, subcubical, depressed, with a wide groove between the eyes, and two low ridges which meet in front of them. Cheeks flat; opercle rounded behind, with a notch at the junction of the subopercle and interopercle. Eyes lateral, nearly round, placed about a diameter from the muzzle (in front of the middle of the upper jaw) and about the same distance apart, with the orbit taking part in the profile. The hinder nostril, which is the larger, is placed very near the orbit. Muzzle short, truncate, submarginate; the under jaw somewhat longer. Mouth-cleft slightly oblique, long, extending much beyond the eyes; the upper border formed entirely of the slender premaxillary, the toothless maxillary being a little dilated at the ends. Two series of subulate teeth in each jaw, those of the inner series being longer, but fewer in number. At the fore end of the upper jaw are two long immoveable hooked teeth, which are inclined towards each other and nearly meet. At the base of each is a minute sharp tooth. Next to the hooked pair is a pair of cur-

ving teeth, which cross one another from opposite sides of the mouth; these are moveable, and are the longest teeth in the upper jaw. At the fore end of the lower jaw there is a pair of very small teeth in front of a larger pair of immoveable teeth, which curve outwards. Next to these are two pairs of still longer moveable teeth, the hinder pair being the longest in the mouth. The other jaw-teeth are much smaller. On the palatines there is a series of small pointed teeth, and the middle line of the tongue is serrate. The vomer is prominent, but toothless. The tongue is grey, narrow, and free near the tip. There is no barbel, nor are there any pseudobranchiæ.

The anterior *dorsal* fin has eleven weak unbranched rays. It commences over the posterior edge of the opercle; and its base is rather less than half the length of the head, its height being about the same. The second dorsal fin is separated from the first by a space equal to about one-third the length of the head. It has a trapezoidal shape, and a longer base than the first dorsal. Its height in front is rather more than half the length of the head. The fourth and fifth rays are rather longer than their neighbours.

The pointed *pectoral* fins are inserted in a line with the eyes, and reach back to the commencement of the second dorsal fin.

The thoracic *ventral* fins are only about half as long as the pectoral fins; their apices are truncate, the first ray being the shortest. All the rays are weak, and none are detached.

The *anal* fin commences about the middle of the total length of the fish, under the fifth or sixth ray of the second dorsal fin. The length of its base is equal to about two-thirds of the length of the head. It becomes low behind. The first ray is short; the second only half as long as the third; the sixth and seventh are the longest.

The *caudal* fin is furcate, and equal in length to two-thirds of the length of the head. There are about fourteen principal rays, with a few small ones at each side.

The *lateral line* is oblique in the pectoral region, but for the greater part of its length is straight along the middle of the body.

An air-bladder of moderate size is present. No anal papilla was observed.

A single example of this new genus of Malacopterygian Fishes was taken in the month of March, and has been deposited in the British Museum. Its stomach contained the doubled-up body of an entire fish nearly twice its own length. The latter proved to be a specimen of *Gonostoma denudata*, Bp. (Faun. Ital. iii. 138), as stated in one of my papers on rare Madeiran Fishes, printed in the 'Ann. & Mag. Nat. Hist.' 1862. The stomach of the fish now described was so much injured that some points of its structure could not be made out. The greatest height of the fish could not be accurately determined, nor could the precise situation of the vent be ascertained. The stomach appeared to be capable of great extension. The rays of the first dorsal fin were unconnected by any membrane, which, however, may have disappeared through rough treatment. The teeth forming the outer series in the upper jaw were about twenty-four on each side, exclusive of the longer teeth

in front; of the inner series only two or three could be counted, others had probably been present. The outer row in the lower jaw consisted of about sixteen teeth on each side, without counting the long ones in front.

The following are the dimensions of the specimen:—

	inches
Total length.....	3 $\frac{7}{10}$
Height over middle of anal, rather more than	$\frac{2}{10}$
Head, length	$\frac{1}{10}$
—, height.....	$\frac{1}{10}$
Eye, diameter	$\frac{1}{5}$
Maxillary	$\frac{1}{10}$
Teeth, length of fourth pair under jaw	$\frac{3}{10}$
First dorsal, height and length of base	$\frac{2}{10}$
— —, distance from muzzle	$\frac{1}{10}$
Second dorsal, distance from muzzle	1 $\frac{6}{10}$
— —, distance from first dorsal.....	$\frac{1}{10}$
— —, length of base	$\frac{2}{10}$
— —, height	$\frac{5}{10}$
Pectorals, length	$\frac{6}{10}$
—, width of base.....	$\frac{1}{10}$
—, distance from muzzle.....	1
Ventrals, length	$\frac{7}{10}$
Anal, distance from muzzle.....	1 $\frac{8}{10}$
—, length of base	$\frac{6}{10}$
—, height in front	$\frac{5}{10}$
Caudal, length.....	$\frac{6}{10}$
Air-bladder, length	$\frac{1}{2}$

MISCELLANEOUS.

Migration of Lemmings.

To the Editors of the Annals of Natural History.

GENTLEMEN,—In a recent Number of the 'Annals and Magazine of Natural History,' the subject of the migration of Lemmings was discussed, and some causes of it, propounded by M. Guyon, mentioned, none of them being quite satisfactory.

I have discovered that rats in England frequently abandon good quarters, where they have plenty of food and are unmolested by man or carnivora, and that the cause of their doing so is that they are plagued with insect vermin—fleas, lice, and ticks.

Knowing that insects are a plague to man in Lapland, I beg to suggest the question whether the occasional migrations of Lemmings may not be caused by the unusual abundance of insect vermin of the above-mentioned or other kinds.

Perhaps I may mention here something I have observed about Dormice. In some parts of Suffolk they are very numerous, and are called *Sleep-meece* by the labourers. In other parts, if turned off in woods equally abounding in oaks and hazel, they seem not to in-